

TIR # 729-S-0018(S)

JUNE 5, 1970

LUNAR ROVING VEHICLE

CREW EQUIPMENT STOWAGE METHODS AND LOCATION

PREPARED BY

GENERAL  ELECTRIC

APOLLO SYSTEMS

HOUSTON PROGRAMS

ITEM NO.	NOMENCLATURE	UNIT WEIGHT LBS.	QUANTITY	LRV STOWAGE ZONE CODE	LM-10 STOWAGE LIST ITEM NO.	LM-10 STOWAGE LOCATION		
						AS	DS	AREA
-	ALHTC (WITH TOOLS)	20.7						
1	ALHTC (TOOL CARRIER)	(10.2)	1	A4	G4035		✓	MESA
2	CAP AND BRACKET ASSY, CORE TUBE	(0.7)	1	A4			✓	MESA (SRC)
3	DISPENSER, 35-BAG	(1.6)	1	A4			✓	MESA (SRC)
4	GNOMON	(0.6)	1	A4	G4035.3		✓	MESA
5	HAMMER	(2.8)	1	A4	G4035.1		✓	MESA
6	HANDLE, EXTENSION	(1.3)	1	A4	G4008		✓	MESA
7	SCOOP, SMALL	(0.4)	1	A4	G4035.4		✓	MESA
8	SCRIBE/BRUSH/LENS	(0.5)	1	A4	G4035.5		✓	MESA
9	STAFF/CAMERA MOUNT	(0.8)	1	A4	G4035.6		✓	MESA
10	TUBES, CORE	(0.6)	3	A4			✓	MESA (SRC)
11	ANTENNA, HIGH GAIN	*6.6	1	F3	E1002		✓	MESA
12	ANTENNA, LOW GAIN	2.5	1	C3	E1002		✓	MESA
13	BAGS, WEIGH	0.6	4	L1(STOW)/A1D&E(USE)	G4018		✓	MESA (SRC)
14	BRUSH, LUNAR DUST	1.4	1	L3	B1045		✓	MESA
15	CAMERA, CLOSE-UP STEREO	10.7	1	A1F	TBD		✓	MESA (TBD)
16	CAMERA SYSTEM, 16 MM DAC	8.9	1	C4		✓		TBD
17	MAGAZINE, 16 MM	(1.0)	2	C4/R3B-E	A0101.1	✓		RHSSC
-	CAMERA SYSTEM, LGEC	9.3						
18	BRACKET, RCU	*(0.8)	1	C2	TBD		✓	MESA
19	COVER, LGEC MAGAZINE	1.8	1	R1	G4030		✓	MESA
20	LGEC (CAMERA)	(6.0)	1	C2	G4021		✓	MESA
21	MAGAZINE, LGEC	(2.5)	2	C2/R1	G4024		✓	MESA
-	CAMERA SYSTEM, 70 MM	7.6						
22	BRACKET, RCU	(0.6)	1	C1	B1001.1	✓		RHSSC
23	CAMERA, 70 MM	(3.1)	1	C1	A1015	✓		RHSSC
24	HANDLE	(0.5)	1	C1	A1028	✓		RHSSC
25	LENS, 60 MM	(1.8)	1	C1	A1016	✓		RHSSC
26	MAGAZINE, 70 MM	(1.4)	2	C1/R2	A0108.1	✓		RHSSC
27	TRIGGER	(0.2)	1	C1	A1027	✓		RHSSC
28	CONTAINER, SPECIAL ENVIRONMENT SAMPLE (SESC)	1.0	1	R3A			✓	MESA (SRC)
29	DISPENSER, 15-BAG	0.2	1	C5 OR C6				TBD
30	DRILL, APOLLO LUNAR SURFACE	17.1	1	A2A	G4002.2		✓	SEQ BAY
31	CAPS AND RETAINERS, CORE STEM	0.15	2 (PKGS)	A2E/A2F				
32	STEMS, CORE	0.45	6	A2C(EMPTY)/L2(FULL)				
33	BIT, CORE	0.1	1	A2C				
34	TREADLE	2.7	1	A2B				
35	WRENCH, DRILL STRING	0.4	2	A2D	G4028		✓	SEQ BAY
36	LCRU	*54.0	1	F1	E1002		✓	MESA
37	LINE, LUNAR SAFETY, W/BAG	1.3	1	R3F	B1041/B1047		✓	MESA
38	MAGNETOMETER, HAND-HELD	*10.1	1	A1A/A1B/A1C			✓	TBD
39	MAPS, LUNAR SURFACE			TBD	A0114.13	✓		FLIGHT DATA FILE
40	SCOOP, LARGE	1.3	1	TBD	G4007		✓	MESA
41	TONGS	*1.0	2	C7(LEFT)/C8(RIGHT)	G4035.2		✓	MESA
42	TOOL, TRENCHING	2.1	1	A1G	G4029		✓	MESA
43	TV SYSTEM, LM COLOR	*13.6	1	F2	E1001		✓	MESA
44	AZ-EL UNIT	*7.0	1	F2			✓	MESA
45	UMBILICAL, BUDDY SYSTEM, W/BAG	10.9	1	A3	B1052/B1053	✓		+Z27 BULKHEAD
*ESTIMATED WEIGHT								

LUNAR ROVING VEHICLE (LRV)
STOWAGE CONCEPTS

The Lunar Roving Vehicle (LRV) will provide the astronauts with increased capability for exploration of the lunar surface after landing of the Lunar Module. Particularly, the LRV will allow the astronauts to range further and faster, thus utilizing the expendables of the crew's Portable Life Support Systems more for "active sample taking" rather than in "walking of the traverses."

The LRV must serve not only as a "taxi" for the astronauts, but also as a "truck" to carry the crew equipment, tools and experimental equipment required for the planned traverses of the lunar surface. Due to the reduced gravity on the lunar surface, this "trucking" becomes a more complex design problem for a lunar surface vehicle. The stowed equipment has more "bounce" on the lunar surface than it would have in an earth environment. As a result, methods for restraint, containment and support are required for all stowed equipment on the LRV.

This handbook illustrates proposed methods for stowing equipment on the LRV. Equipment items to be stowed on the LRV and their related data are listed for reference on the left-hand facing page 1. "Stowage areas" on the vehicle have been coded for ease of reference. The right-hand foldout (page 25) identifies all the coded area designations and related stowed items. The stowage concepts for the unique stowage areas are illustrated in detail on the following pages that are arranged alphanumerically by area codes:

<u>CODES</u>		<u>GENERAL AREA DESCRIPTIONS</u>
A's	=	Vehicle Areas Aft of Seats
C's	=	Console Areas
F's	=	Forward Vehicle Areas
R's	=	Areas Under Right Seat
L's	=	Areas Under Left Seat

A1
STOWAGE FRAME

A1 - AFT STOWAGE FRAME
(STOWED)

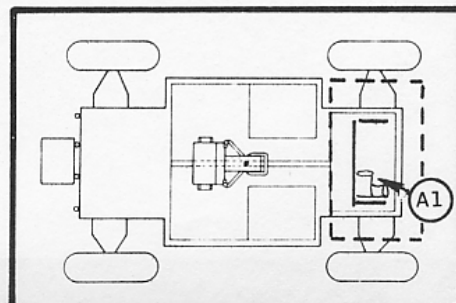
A2 - STOWAGE
PEDESTAL

CAUTION

THE **A1** AFT STOWAGE FRAME
MUST BE UNFOLDED BEFORE
UNFOLDING THE **A2** STOWAGE
PEDESTAL.

A1 - BAG HOLDER LOCKS IN
PLACE IN HORIZONTAL POSITION

A1 - AFT FRAME
LOCKS IN PLACE IN VERTICAL
"UPRIGHT" POSITION



A1A LUNAR
A1B SURFACE
A1C MAGNETOMETER

A1A
LSM ELECT. PKG.

NOTE: PKG. SITS IN BAG AT
A 15° TILT FOR EASIER
READING BY ASTRONAUT.

A1B
LSM
REEL

BAG HANDLES
ARE SPRING
LOADED

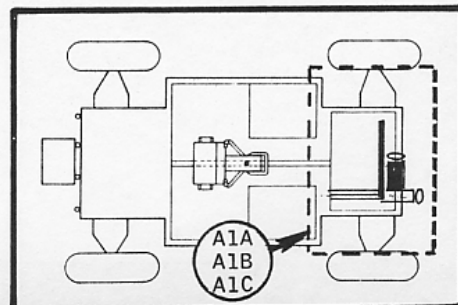
AFT TRIPOD
BRACKET
(FOLDS FORWARD
TO STOW)

A1C
LSM
TRIPOD
AND
SENSOR

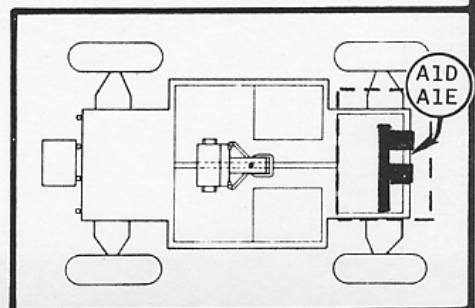
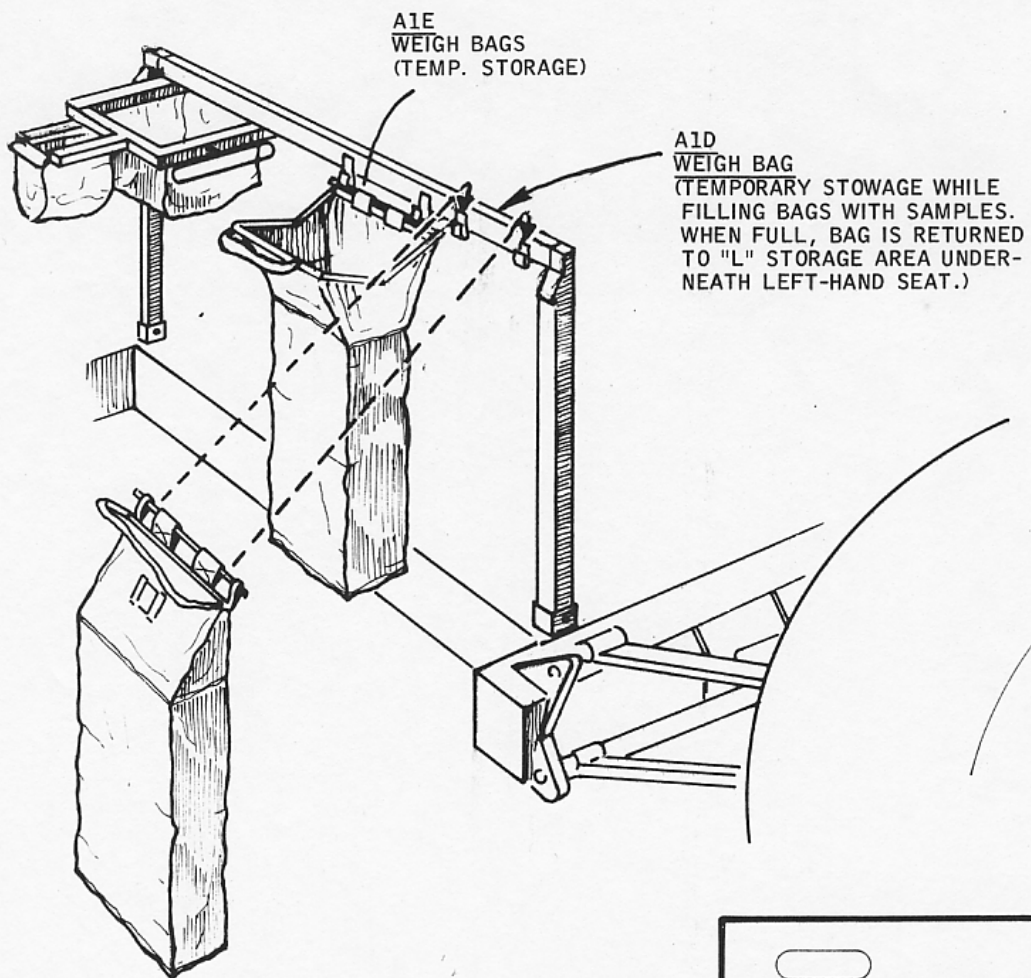
TRIPOD
BRACKET
(FOLDS TO
AFT POSITION
TO STOW)

A1C
(TRIPOD STOWAGE AREA)

AFT



A1D WEIGH BAG
A1E (TEMP. STOW.)



CLOSE-UP
A1F STEREO
CAMERA

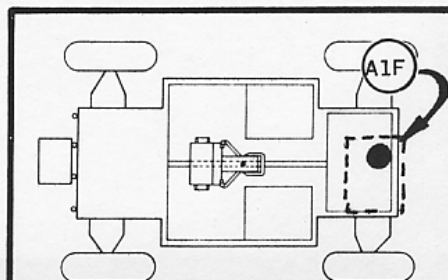
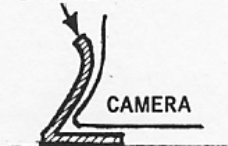
CLOSE-UP STEREO
CAMERA CLIP

STOWS VERTICALLY,
FOLDS AND LOCKS
IN HORIZONTAL
POSITION

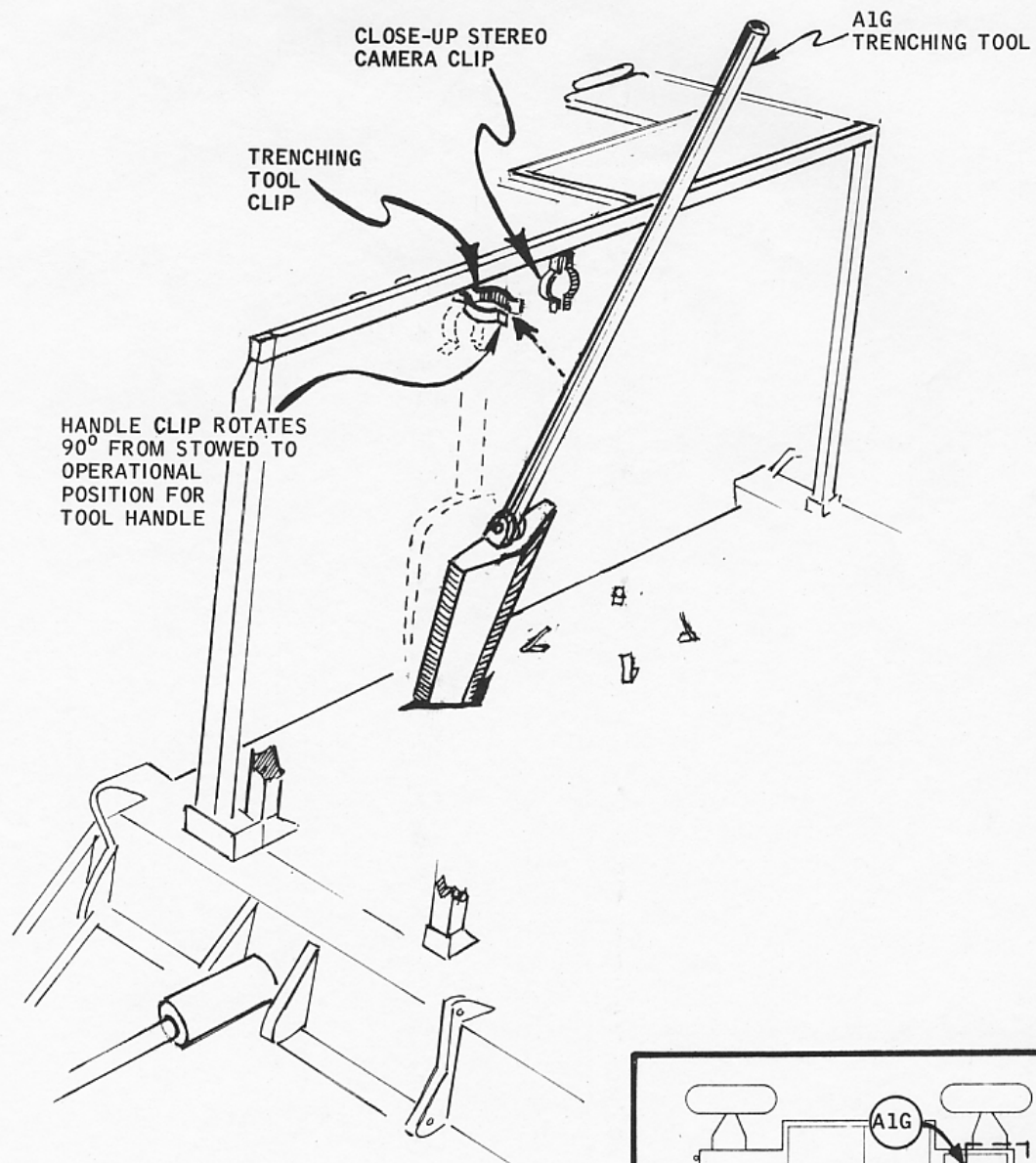
A1F - CLOSE-UP STEREO CAMERA

- CAMERA IS PLACED ON PALETTE
WITHIN SUPPORTING BRACKETS
- THEN CAMERA IS PLACED
INTO CLIP THAT HAS BEEN
UNSTOWED TO HORIZONTAL
POSITION

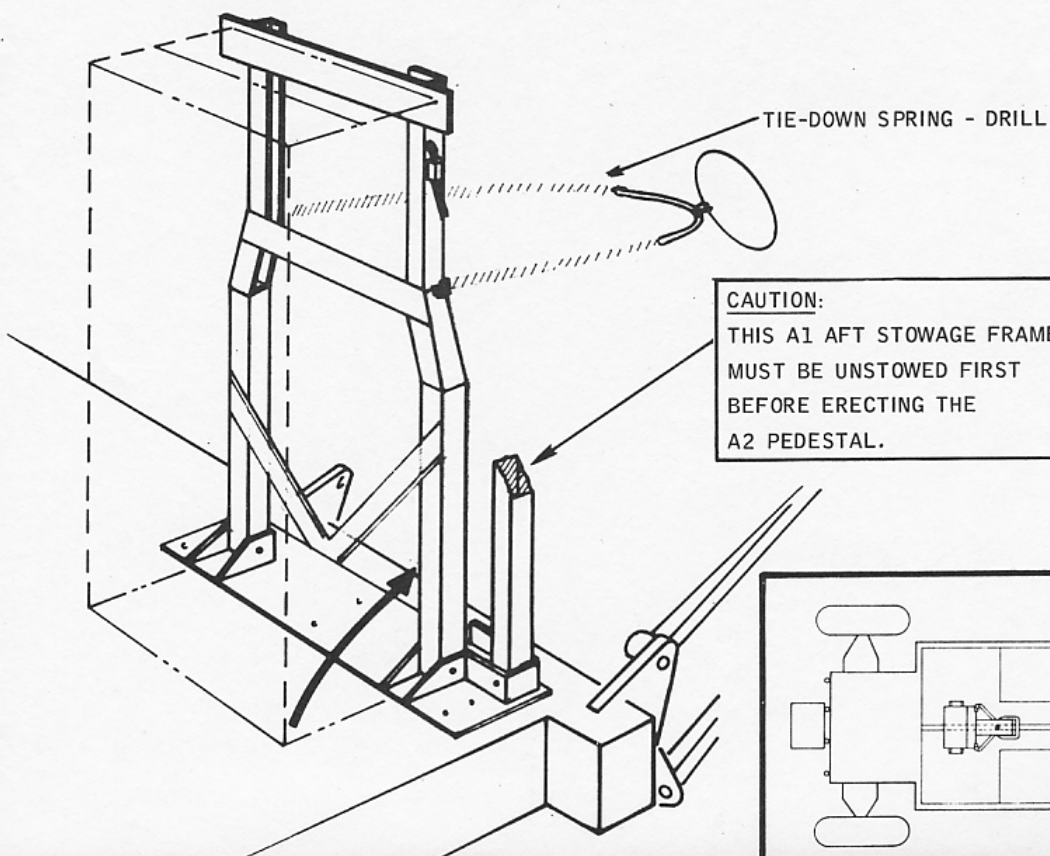
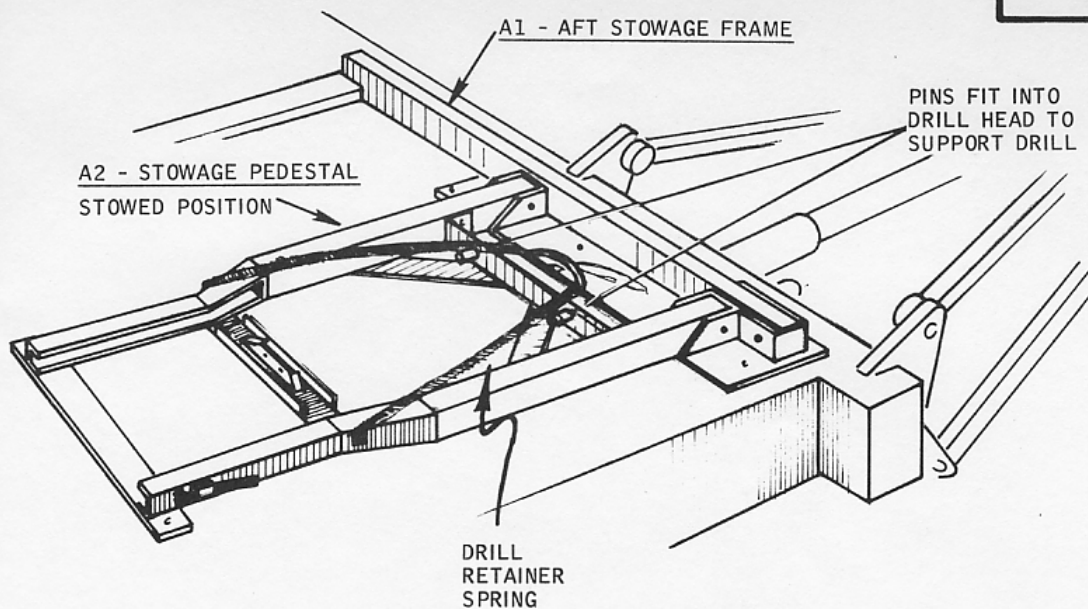
CAMERA RETAINER
BRACKET



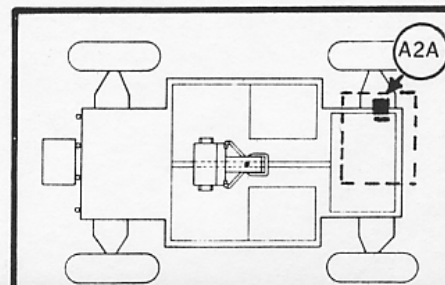
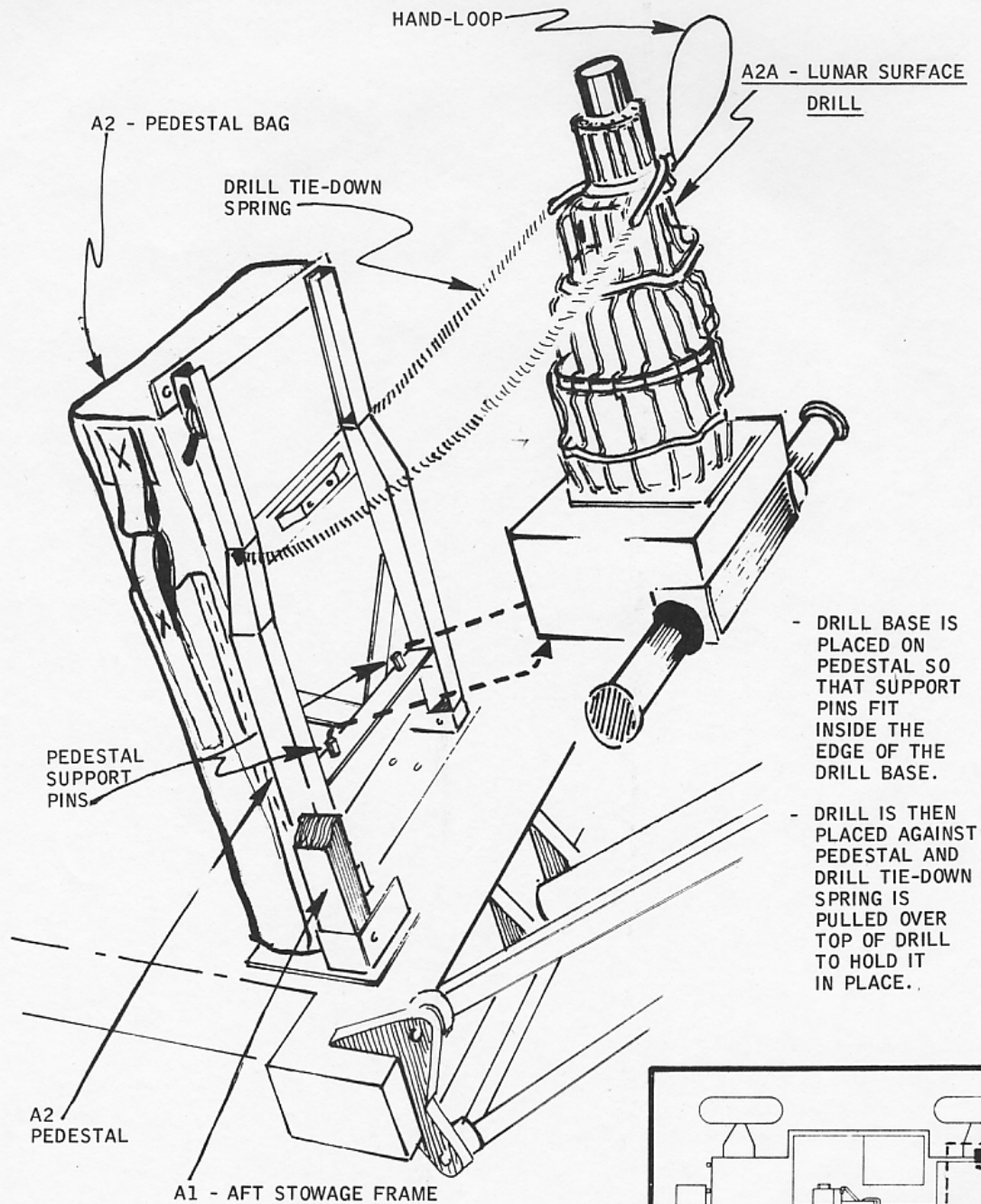
A1G
TRENCHING
TOOL

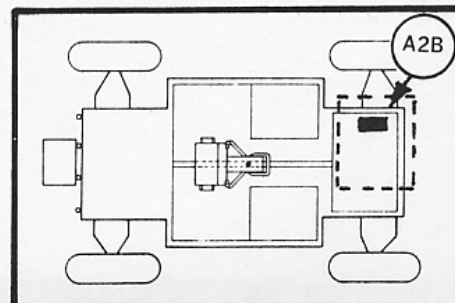
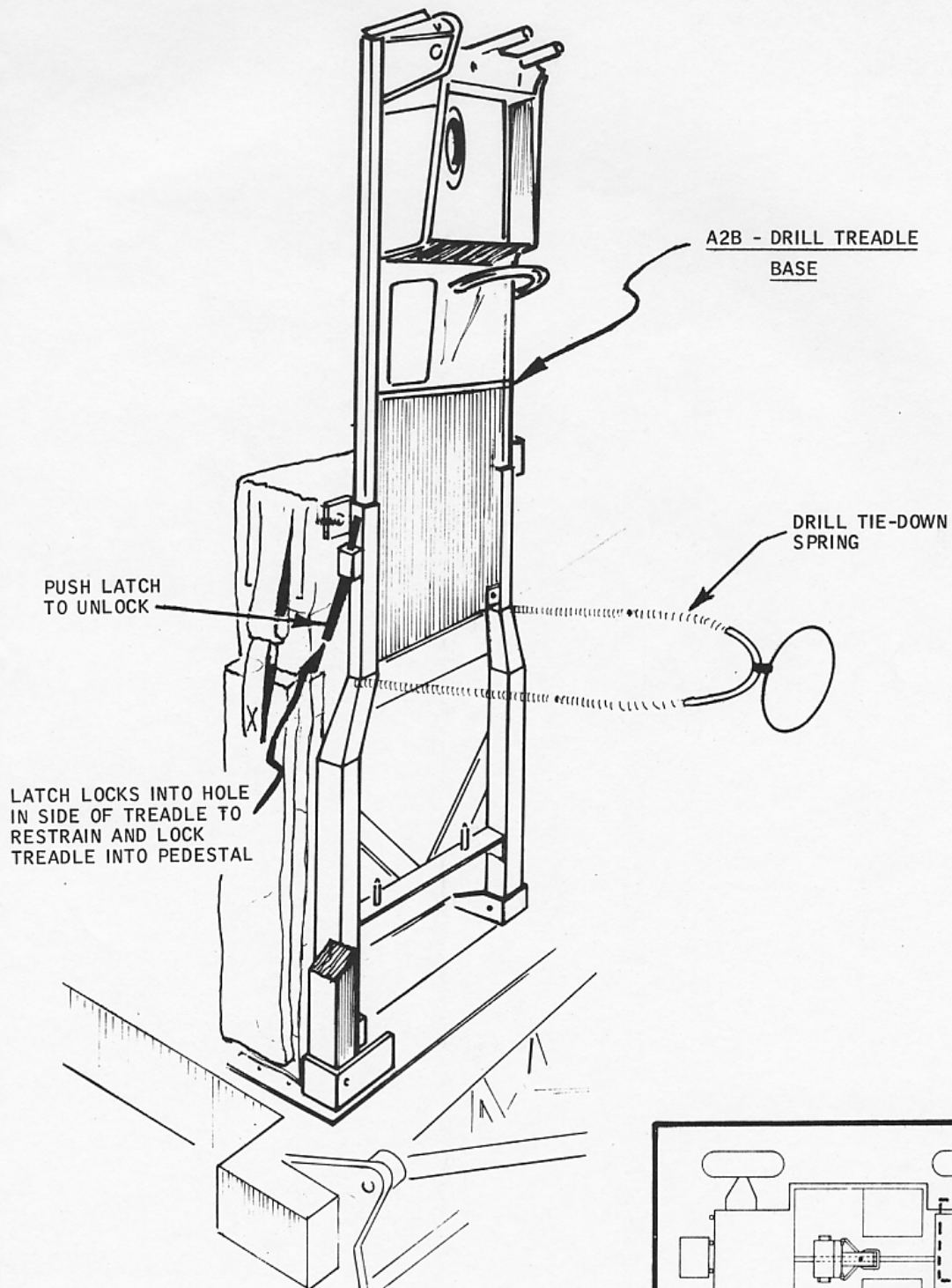


A2 STOWAGE
PEDESTAL

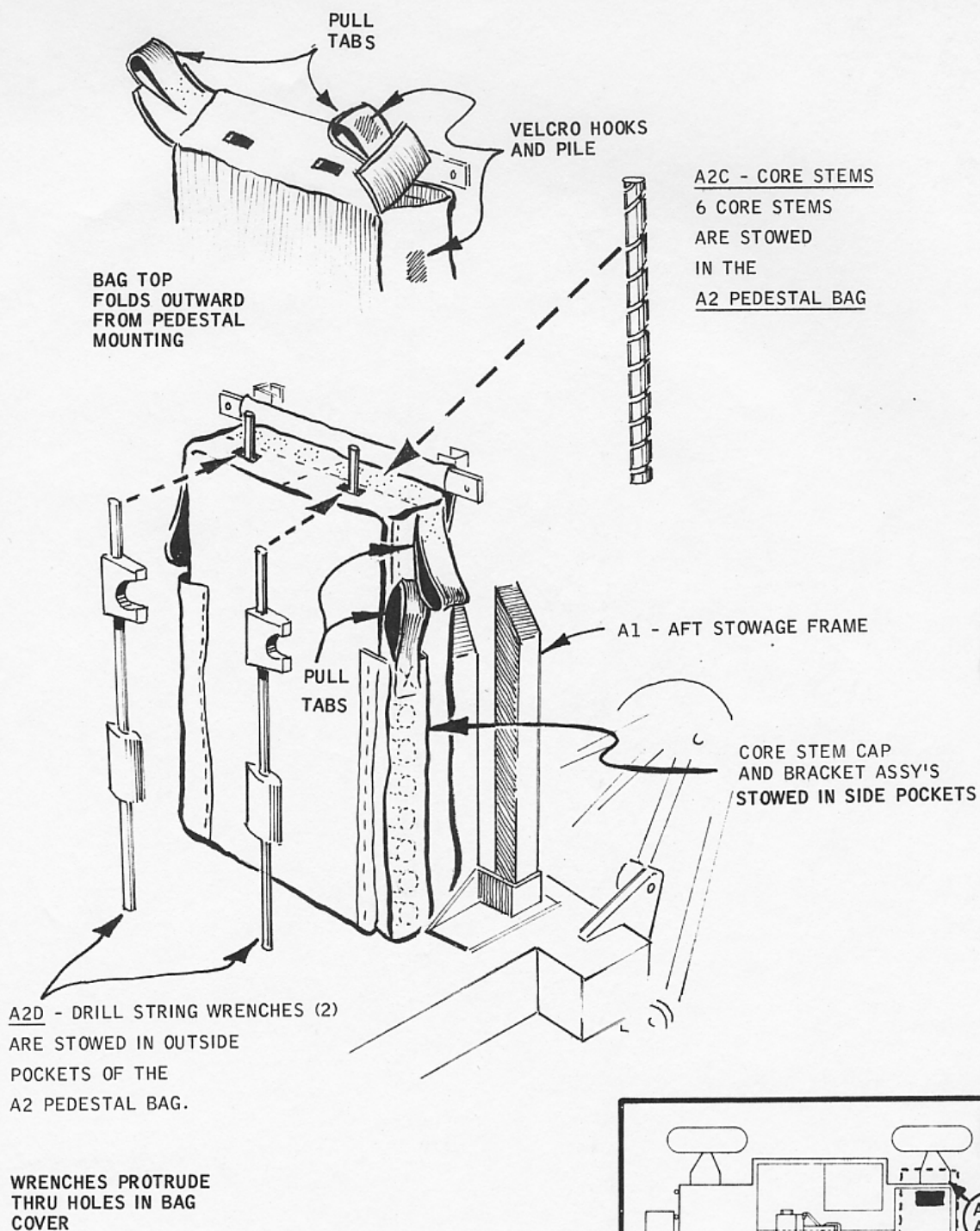


A2A LUNAR SURFACE
DRILL





**A2C CORE STEMS
DRILL STRING
A2D WRENCH**

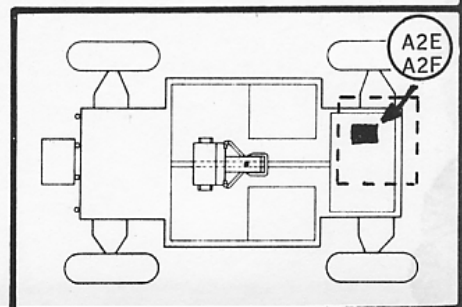


A2E, A2F
CORE STEM CAP
AND BRACKET ASSY'S

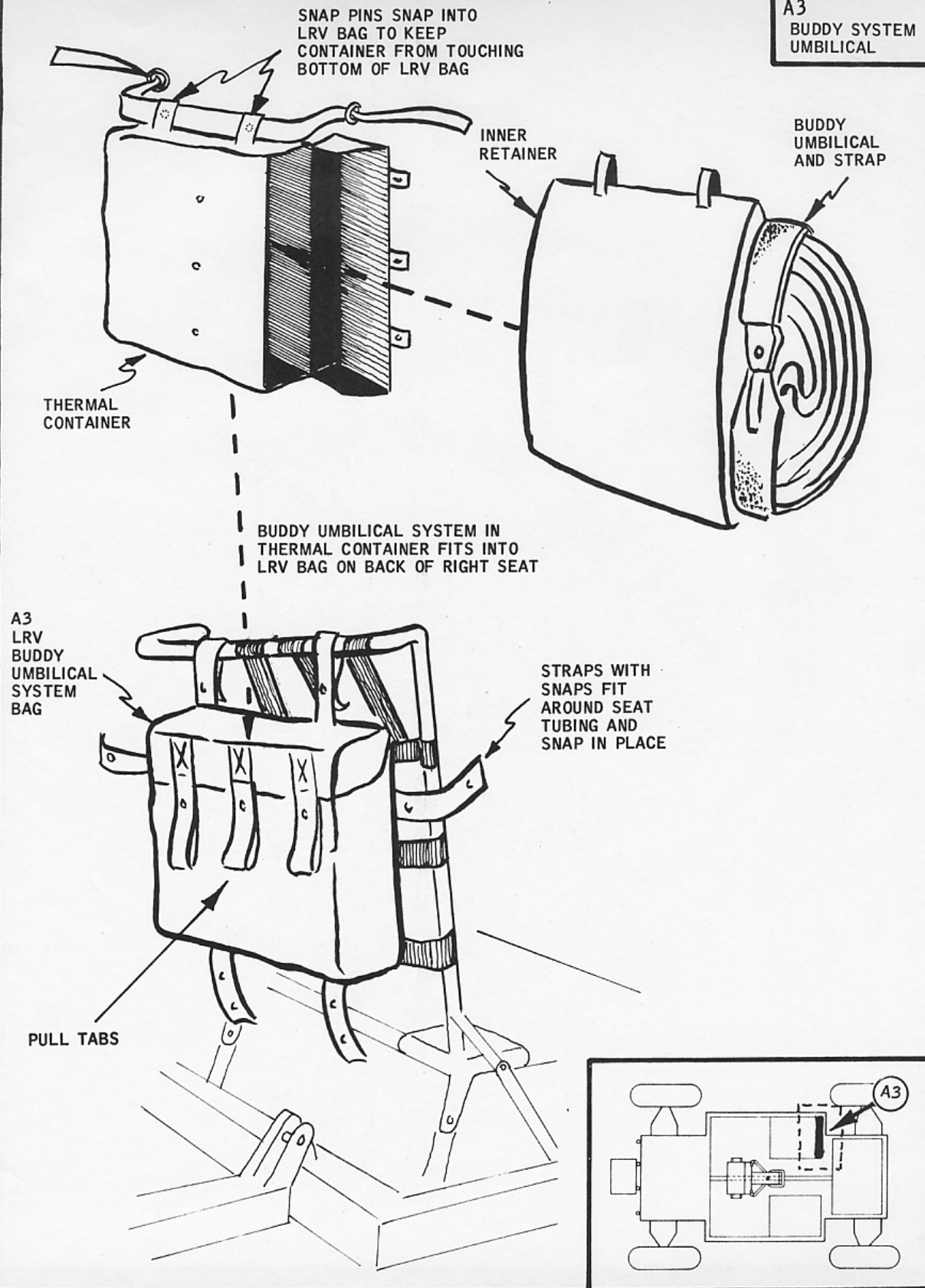
A2E, A2F
CORE STEM CAP AND
BRACKET ASSEMBLY

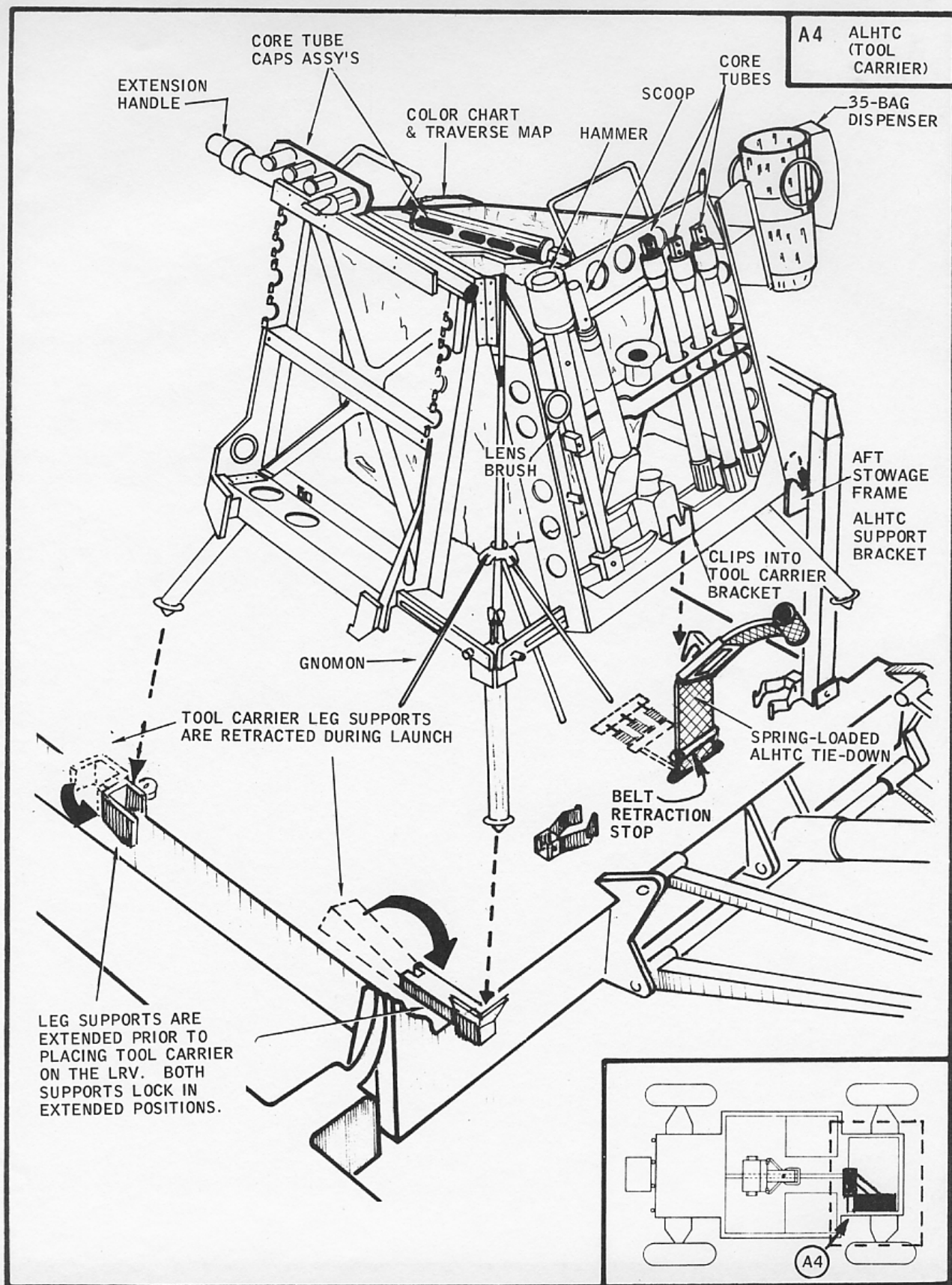
TAB WITH
VELCRO HOOKS
AND PILE

A1 - AFT STOWAGE FRAME

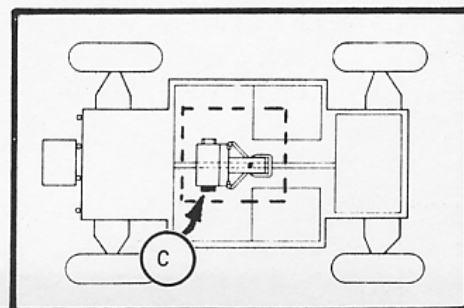
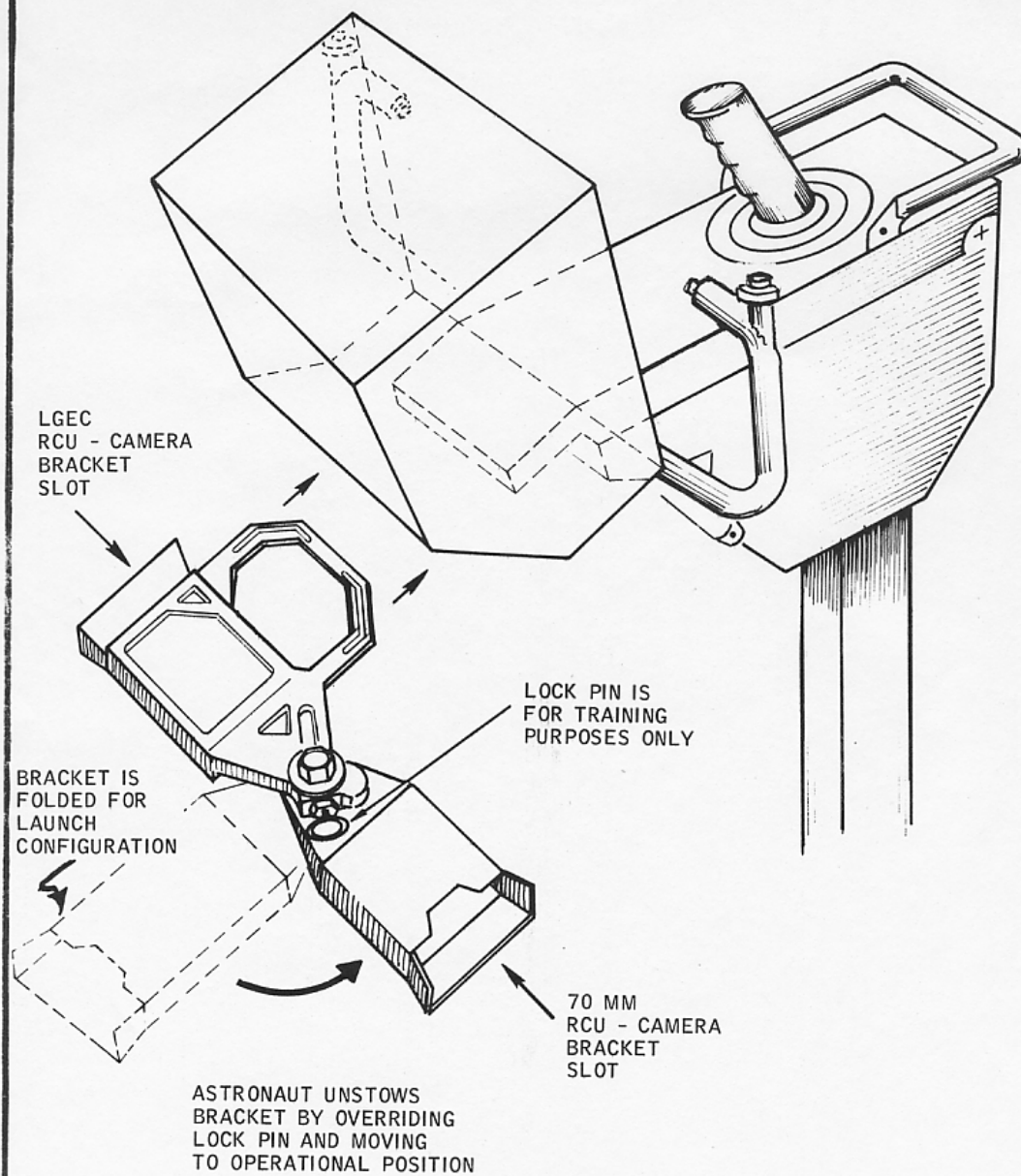


**A3
BUDDY SYSTEM
UMBILICAL**

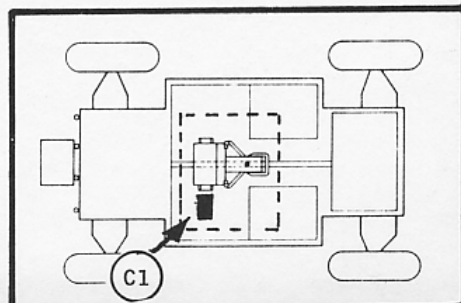
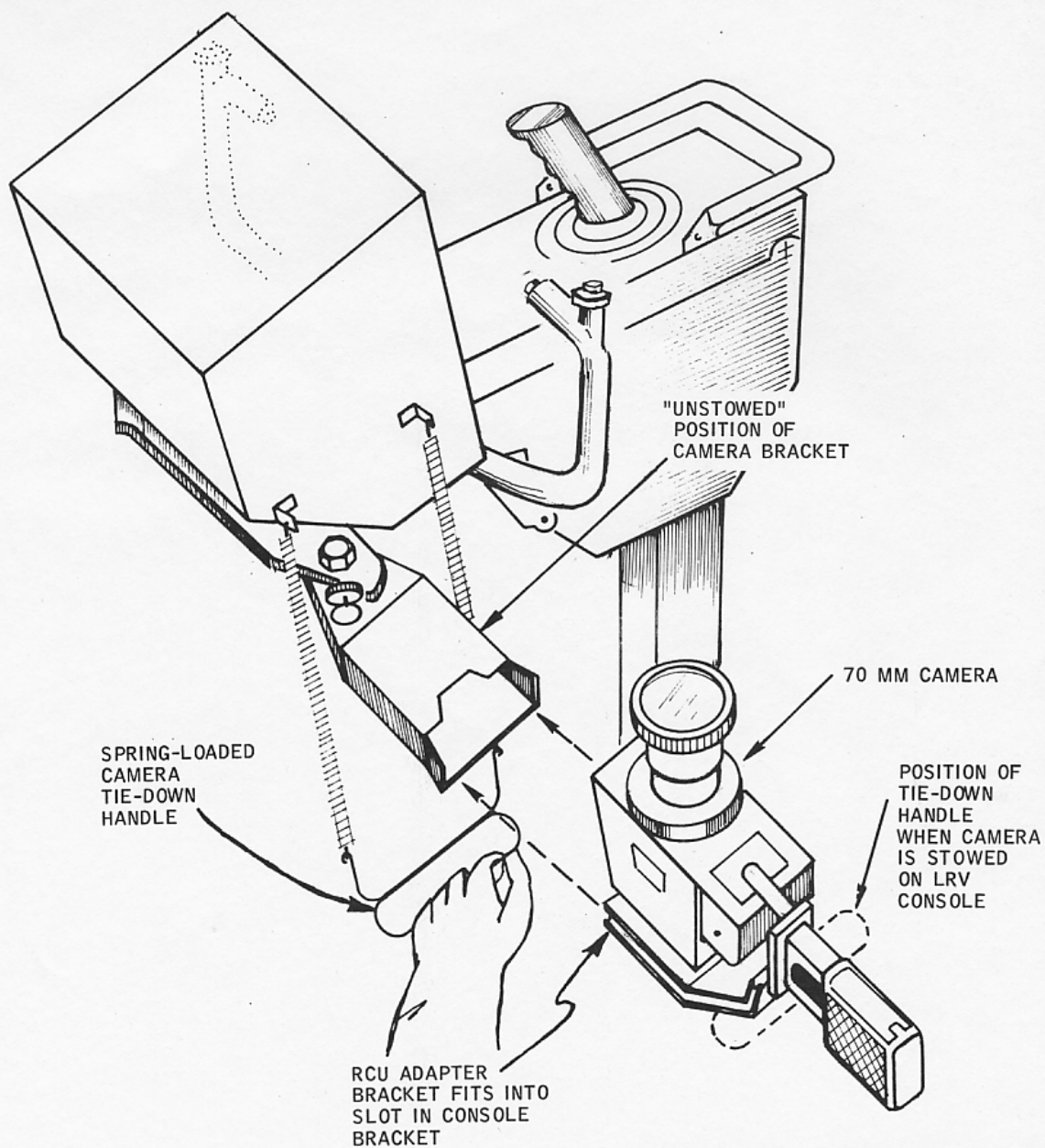




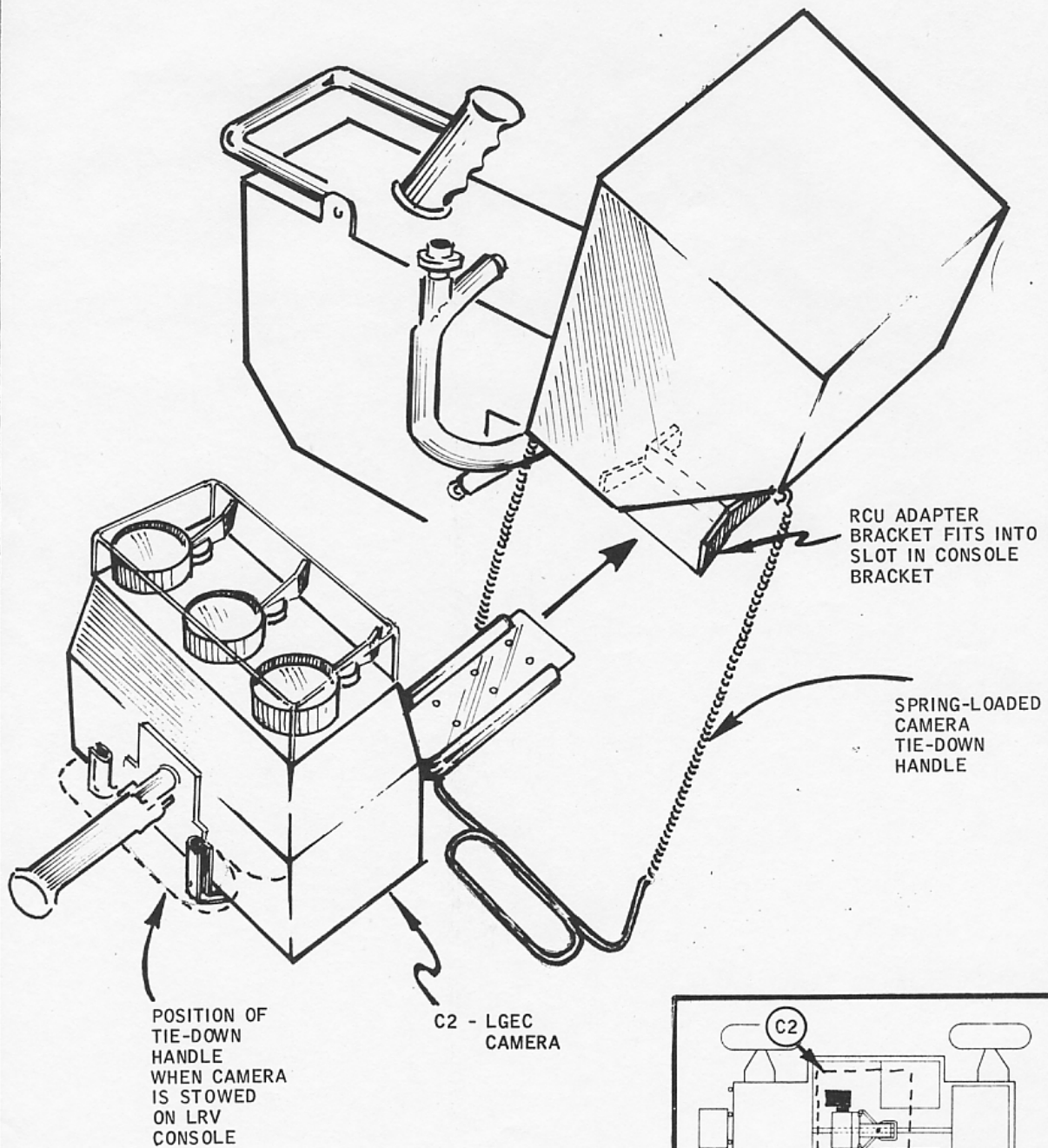
C CONSOLE
BRACKET



C1 70 MM
CAMERA



C2 LGEC
CAMERA



C3
16 MM DATA ACQUISITION
CAMERA

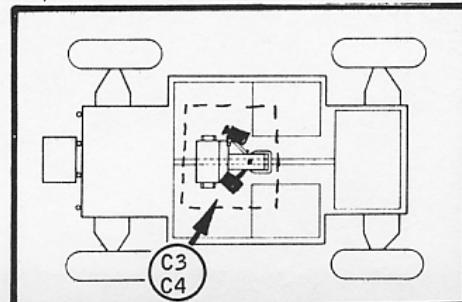
C3 LOW GAIN ANT
C4 16 MM DAC

C4
LOW GAIN
ANTENNA

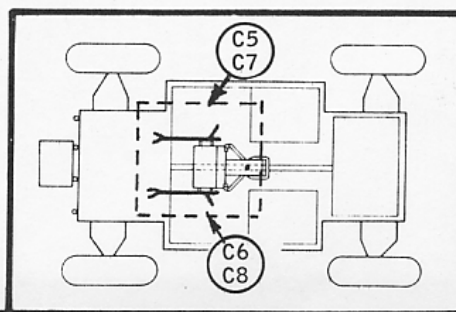
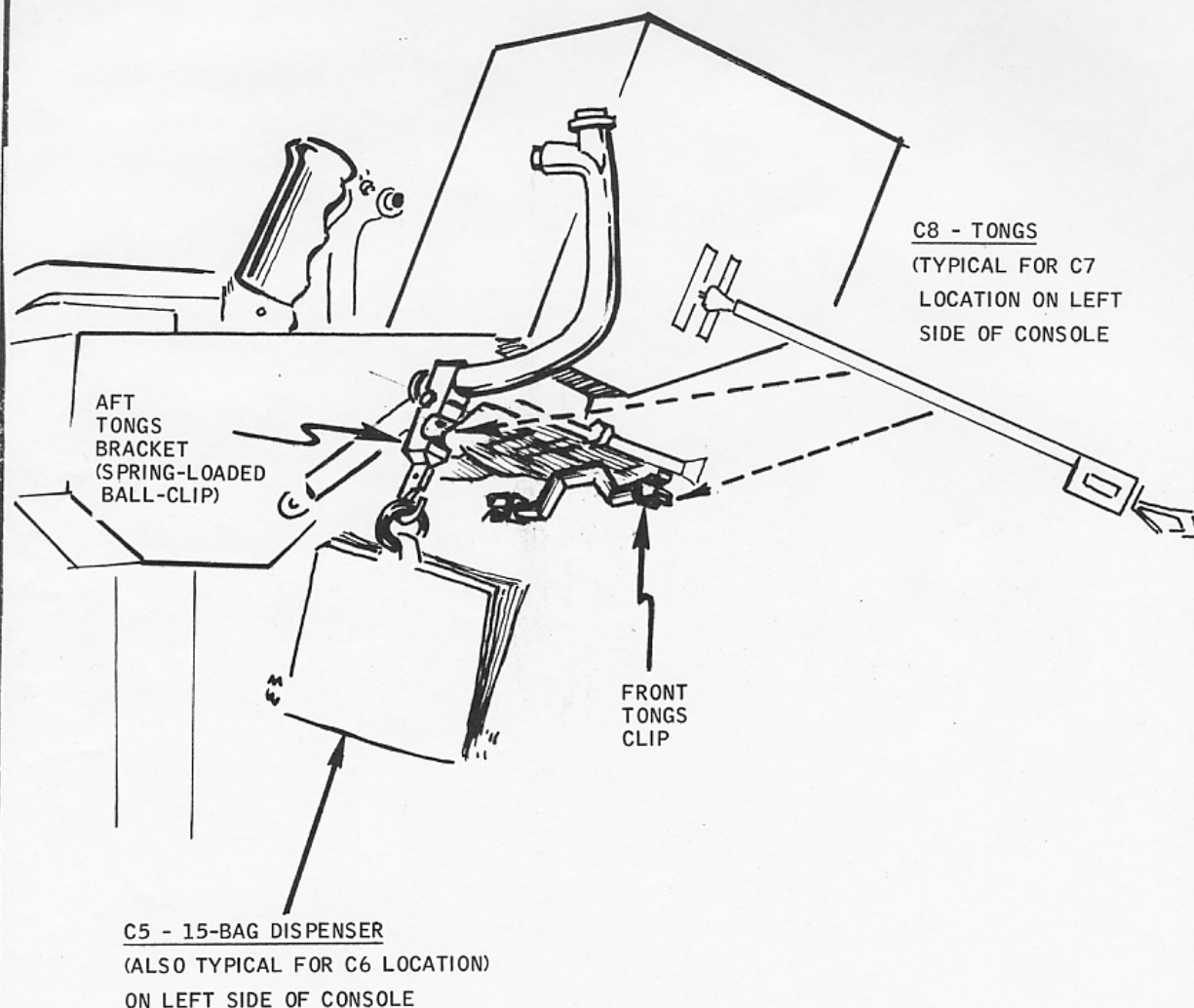
NOTE:
THE CAMERA AND
ANTENNA MAY BE
INTERCHANGED BETWEEN
C3 AND C4 STOWAGE
POSITIONS ON HANDLES,
IF REQUIRED, FOR
BETTER LINE OF SIGHT
COMMUNICATIONS

TO ROTATE AZIMUTH
SETTING, GRASP HANDLE,
PUSH DOWN TO UNLOCK,
TURN TO DESIRED SETTING
AND RELEASE. STAFF LOCKS
IN LAST POSITION.

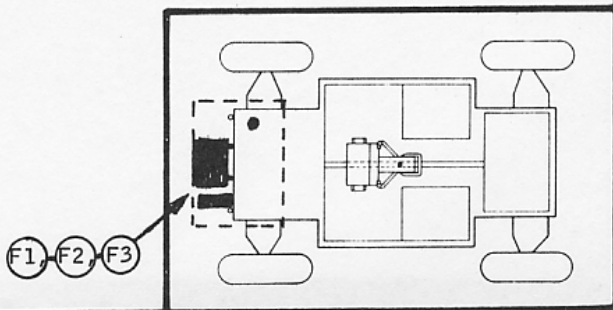
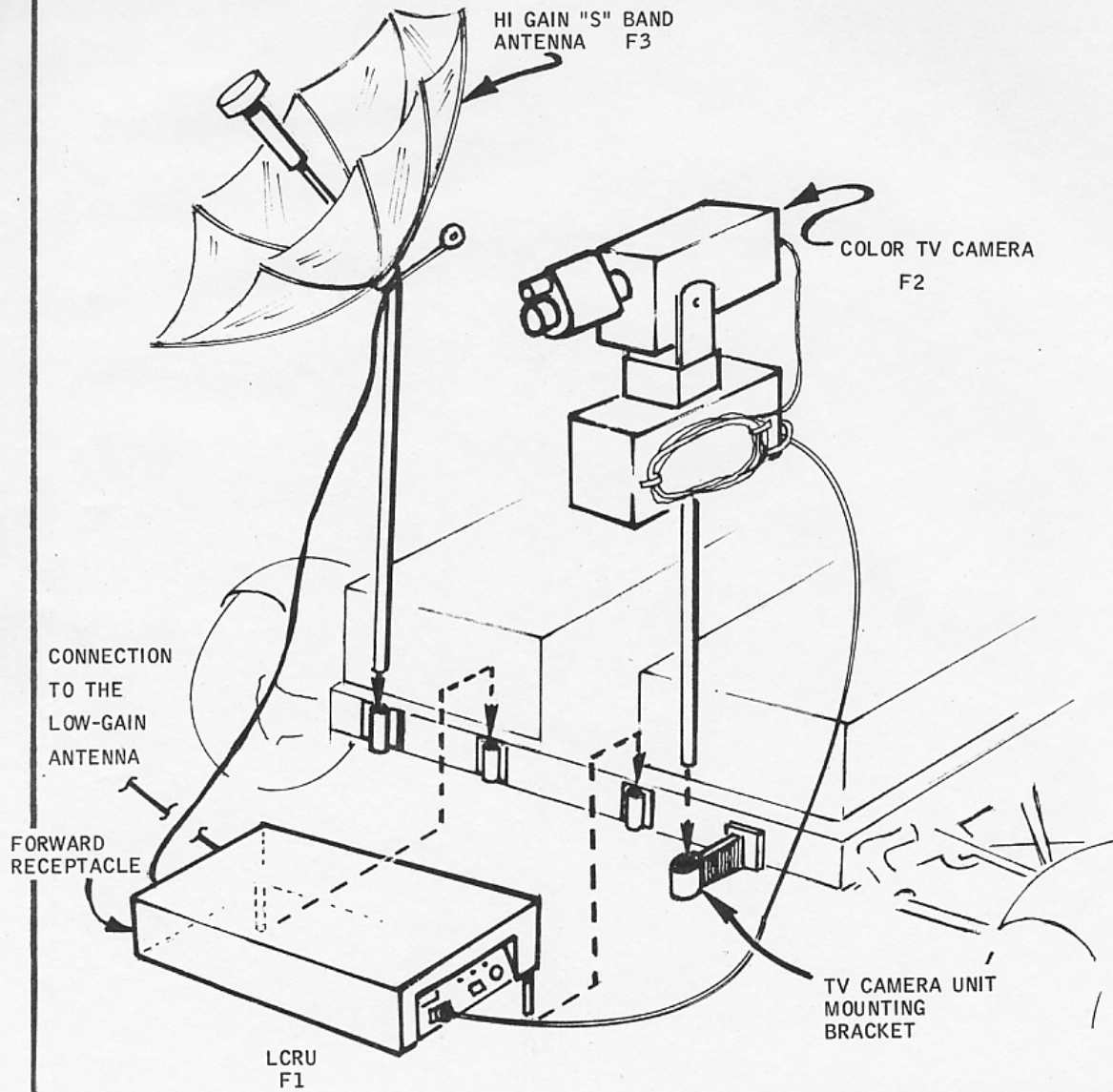
PUSH BUTTON
TO RELEASE AND/OR
REMOVE STAFF
FROM HANDHOLD



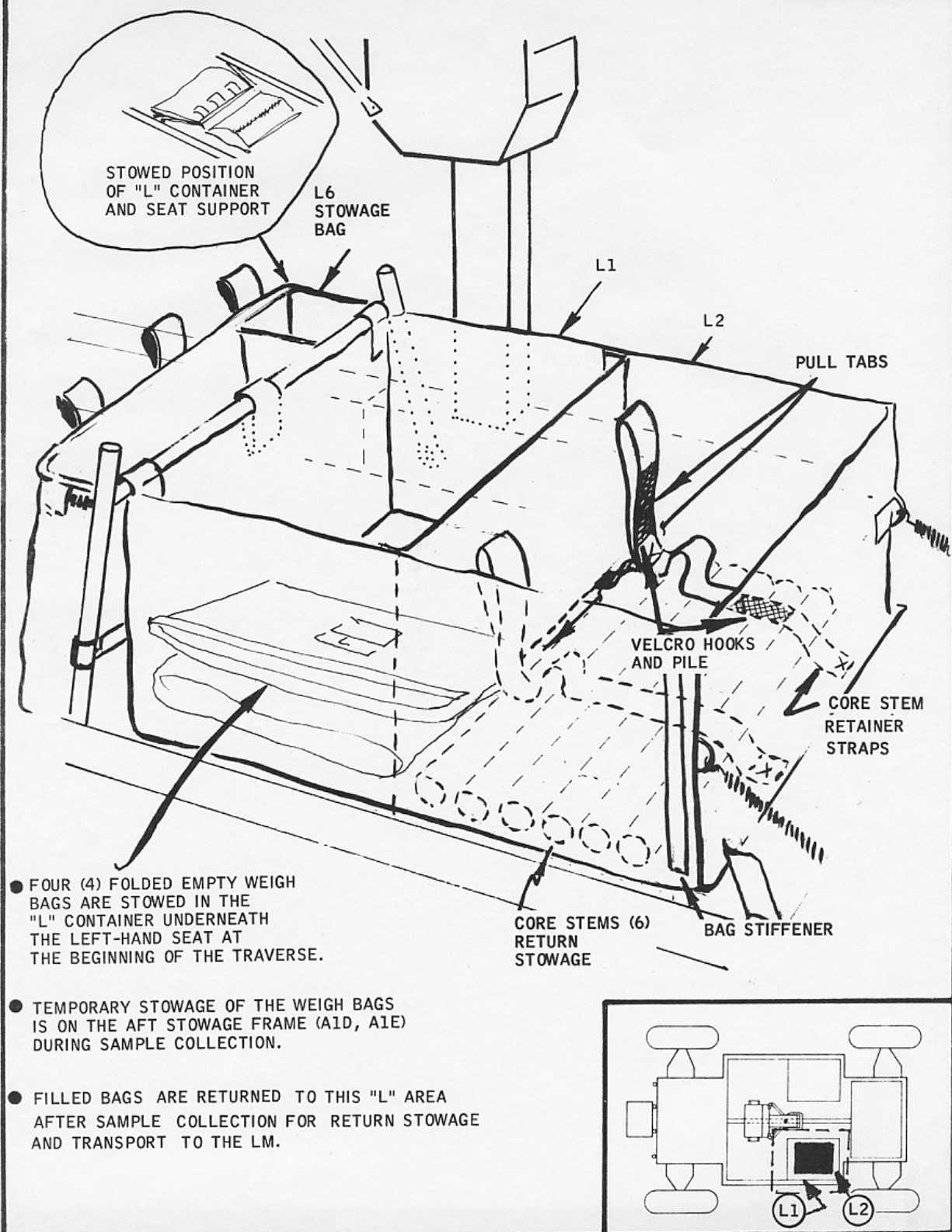
C5, C6 - 15-BAG DISP.
C7, C8 - TONGS



- F1 - LCRU
- F2 - COLOR TV CAMERA
- F3 - HIGH GAIN "S" BAND ANTENNA



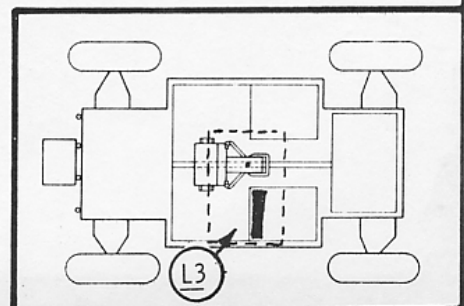
L1 - WEIGH BAGS
L2 - CORE STEMS

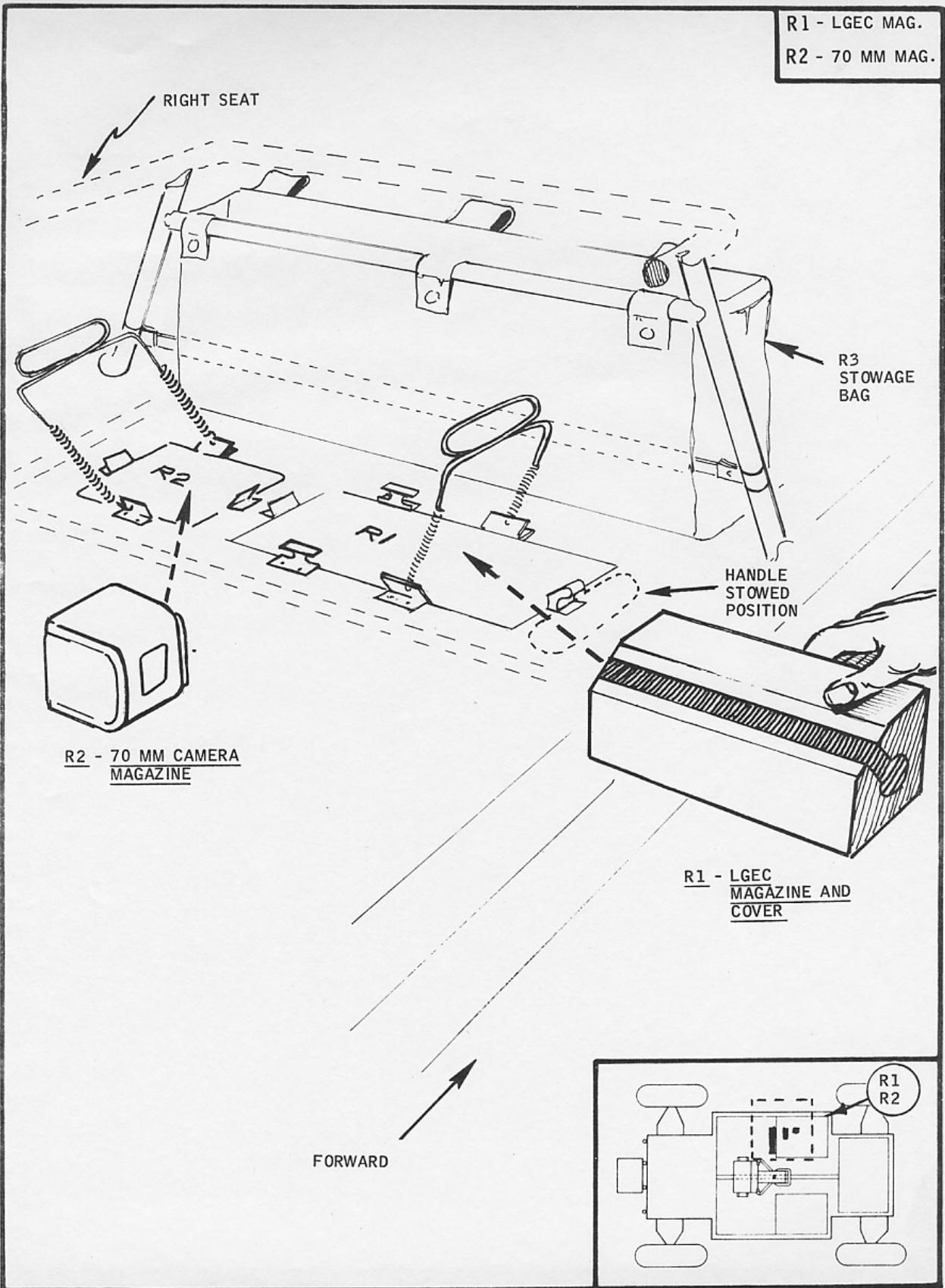


L3 LUNAR DUST
BRUSH
L4 (MISC.)

LUNAR
DUST
BRUSH

BUTTONS
ATTACH TO
FRONT OF
L(1-2) BAG





**R3 RIGHT SEAT
FORWARD
STOWAGE BAG**

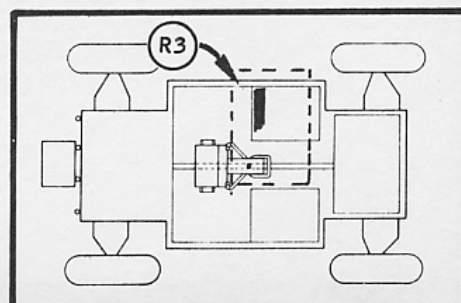
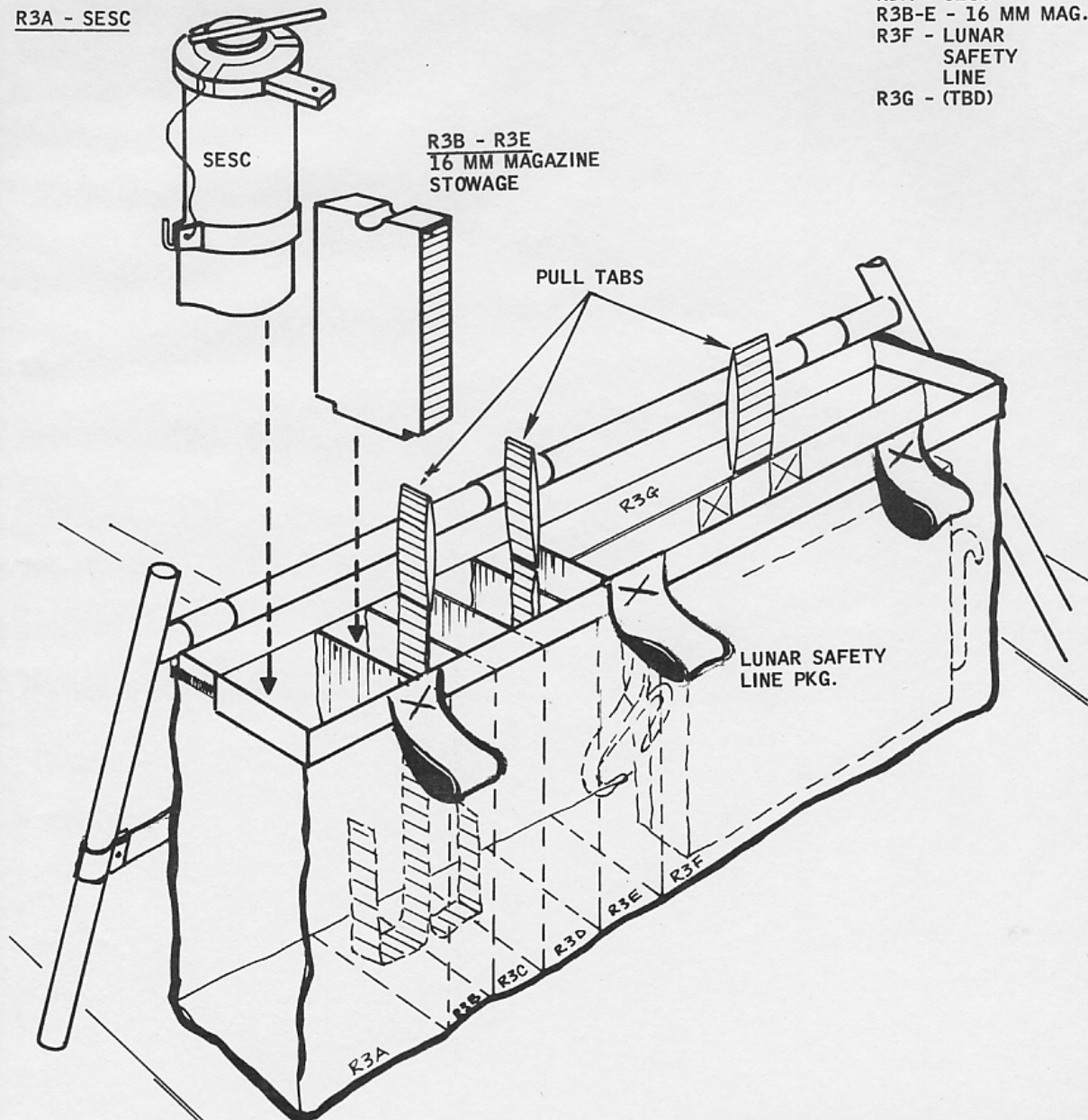
R3A - SESC

R3A - SESC
R3B-E - 16 MM MAG.
R3F - LUNAR
SAFETY
LINE
R3G - (TBD)

R3B - R3E
16 MM MAGAZINE
STOWAGE

PULL TABS

LUNAR SAFETY
LINE PKG.



STOWAGE AREA CODES

- A's - AFT VEHICLE (AFT OF SEATS)
- C's - CONSOLE AREA
- F's - FORWARD VEHICLE AREAS
- L's - LEFT SEAT AREAS
- R's - RIGHT SEAT AREAS

